

# Claims

[c1] **WHAT IS CLAIMED IS:**

1. A motor control circuit for controlling a motor drive circuit to operate a motor among a forward rotation mode, a reverse rotation mode, and a brake mode, the motor control circuit comprising:
  - a first current source from which a first current signal originates;
  - a second current source from which a second current signal originates;
  - a third current source from which a third current signal originates;
  - a fourth current source from which a fourth current signal originates;
  - a forward rotation control circuit for allowing the first current signal to be supplied to the motor drive circuit, thereby operating the motor in the forward rotation mode;
  - a reverse rotation control circuit for allowing the third current signal to be supplied to the motor drive circuit, thereby operating the motor in the reverse rotation mode; and
  - a brake control circuit for allowing the second and the

fourth current signals to be both supplied to the motor drive circuit, thereby operating the motor in the brake mode.

- [c2] 2. The motor control circuit according to claim 1, wherein:
  - the second current signal is smaller than the first current signal, and
  - the fourth current signal is smaller than the third current signal.
- [c3] 3. The motor control circuit according to claim 1, wherein:
  - the forward rotation control circuit comprises:
    - a switch coupled to the first current source, and
    - a logical circuit for controlling the switch in response to a forward rotation command signal and a reverse rotation command signal so as to allow the first current signal to be supplied to the motor drive circuit.
- [c4] 4. The motor control circuit according to claim 3, wherein:
  - the switch comprises:
    - a first transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to receive a reference current, the base electrode being coupled to the collector electrode,

and the emitter electrode being coupled to a ground potential, and

a second transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to the first current source, the base electrode being coupled to the base electrode of the first transistor, and the emitter electrode being coupled to the ground potential, wherein:

the base electrode of the first transistor and the base electrode of the second transistor are controlled by the logical circuit.

[c5] 5. The motor control circuit according to claim 3,

wherein:

the logical circuit comprises:

an inverter having an input terminal and an output terminal, the input terminal being coupled to receive the forward rotation command signal, and

a NOR gate having a first input terminal, a second input terminal, and an output terminal, the first input terminal being coupled to receive the reverse rotation command signal, the second input terminal being coupled to the output terminal of the inverter, and the output terminal being coupled to control the switch.

[c6] 6. The motor control circuit according to claim 1,

wherein:

the reverse rotation control circuit comprises:  
a switch coupled to the third current source, and  
a logical circuit for controlling the switch in response to  
a forward rotation command signal and a reverse rota-  
tion command signal so as to allow the third current sig-  
nal to be supplied to the motor drive circuit.

[c7] 7. The motor control circuit according to claim 6,  
wherein:

the switch comprises:  
a first transistor having a collector electrode, a base  
electrode, and an emitter electrode, the collector elec-  
trode being coupled to receive a reference current, the  
base electrode being coupled to the collector electrode,  
and the emitter electrode being coupled to a ground po-  
tential, and  
a second transistor having a collector electrode, a base  
electrode, and an emitter electrode, the collector elec-  
trode being coupled to the third current source, the base  
electrode being coupled to the base electrode of the first  
transistor, and the emitter electrode being coupled to  
the ground potential, wherein:  
the base electrode of the first transistor and the base  
electrode of the second transistor are controlled by the  
logical circuit.

[c8] 8. The motor control circuit according to claim 6, wherein:  
the logical circuit comprises:  
an inverter having an input terminal and an output terminal, the input terminal being coupled to receive the reverse rotation command signal, and  
a NOR gate having a first input terminal, a second input terminal, and an output terminal, the first input terminal being coupled to receive the forward rotation command signal, the second input terminal being coupled to the output terminal of the inverter, and the output terminal being coupled to control the switch.

[c9] 9. The motor control circuit according to claim 1, wherein:  
the brake control circuit comprises:  
a first switch coupled to the second current source for allowing the second current signal to be supplied to the motor drive circuit in response to a forward rotation command signal, and  
a second switch coupled to the fourth current source for allowing the fourth current signal to be supplied to the motor drive circuit in response to a reverse rotation command signal.

[c10] 10. The motor control circuit according to claim 9, wherein:

the first switch comprises:

a first transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to receive a reference current, the base electrode being coupled to the collector electrode, and the emitter electrode being coupled to a ground potential, and

a second transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to the second current source, the base electrode being coupled to the base electrode of the first transistor, and the emitter electrode being coupled to the ground potential, wherein:

the base electrode of the first transistor and the base electrode of the second transistor are controlled by the forward rotation command signal.

[c11] 11. The motor control circuit according to claim 9, wherein:

the second switch comprises:

a first transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to receive a reference current, the base electrode being coupled to the collector electrode, and the emitter electrode being coupled to a ground potential, and

a second transistor having a collector electrode, a base electrode, and an emitter electrode, the collector electrode being coupled to the fourth current source, the base electrode being coupled to the base electrode of the first transistor, and the emitter electrode being coupled to the ground potential, wherein:  
the base electrode of the first transistor and the base electrode of the second transistor are controlled by the reverse rotation command signal.

- [c12] 12. The motor control circuit according to claim 9, wherein:  
the brake control circuit further comprises:  
a first inverter and a second inverter, connected in series, through which the forward rotation command signal controls the first switch, and  
a third inverter and a fourth inverter, connected in series, through which the reverse rotation command signal controls the second switch.
- [c13] 13. The motor control circuit according to claim 12, wherein:  
each of the first to the fourth inverters is implemented by a bipolar transistor.
- [c14] 14. The motor control circuit according to claim 1, wherein:

each of the first to the fourth current sources is implemented by a constant current source.

- [c15] 15. The motor control circuit according to claim 1, wherein:  
the motor drive circuit is implemented by an H-bridge drive circuit.
- [c16] 16. A motor control circuit comprising:  
a rotation control circuit for providing a rotation current signal to control a rotation operation of a motor, and  
a brake control circuit for providing a brake current signal to control a brake operation of the motor, wherein:  
the brake current signal and the rotation current signal originates from different current sources.
- [c17] 17. The motor control circuit according to claim 16, wherein:  
the brake current signal is smaller than the rotation current signal.
- [c18] 18. The motor control circuit according to claim 16, wherein:  
the rotation control circuit comprises:  
a forward rotation control circuit for providing a forward rotation current signal to control a forward rotation operation of the motor, and

a reverse rotation control circuit for providing a reverse rotation current signal to control a reverse rotation operation of the motor;

the rotation current signal comprises the forward rotation current signal and the reverse rotation current signal; and

the rotation operation of the motor comprises the forward rotation operation and the reverse rotation operation.

[c19] 19. The motor control circuit according to claim 16, further comprising:

a rotation current source, controlled by the rotation control circuit, from which the rotation current signal originates, and

a brake current source, controlled by the brake control circuit, from which the brake current signal originates.

[c20] 20. The motor control circuit according to claim 19,

wherein:

the rotation control circuit comprises:

a forward rotation control circuit for providing a forward rotation current signal to control a forward rotation operation of the motor, and

a reverse rotation control circuit for providing a reverse rotation current signal to control a reverse rotation operation of the motor;

the rotation current signal comprises the forward rotation current signal and the reverse rotation current signal;

the rotation operation of the motor comprises the forward rotation operation and the reverse rotation operation;

the rotation current source comprises:

a forward rotation current source, controlled by the forward rotation control circuit, from which the forward rotation current signal originates, and

a reverse rotation current source, controlled by the reverse rotation control circuit, from which the reverse rotation current signal originates; and

the brake current source comprises:

a first brake current source and a second brake current source, controlled by the brake control circuit, from which the brake current signal originates.